APPENDIX C
INVENTORY STUDY AND IMPACT ASSESSMENT METHODS

EARTH AND WATER RESOURCES

Inventory Study Methods – Geology/Soils

The analysis of geologic resources first involved a review of the regional physiographic setting of the study area, followed by a more specific investigation and evaluation of resource features that could adversely affect, or be adversely affected by, construction, operation, or maintenance of the proposed transmission line. For purposes of the EIS, the study corridor for geologic resources was 0.5 mile wide, centered along the proposed centerline of each of the alternative transmission line routes.

Information for the geologic inventory was obtained and reviewed from various federal, state, and local agencies, including the following:

- existing USGS geologic, topographic, and slope stability maps of the Anchorage area and the Kenai Peninsula; and USGS historical seismic activity databases
- aerial photographs (1996) at a scale of 1:2,000 (1 inch equals 2,000 feet) flown along the alternative routes
- NOAA and Minerals Management Service studies
- various maps and information available from municipality and borough planning departments showing surficial geology, geologic hazards, and soil conditions
- ADOT/PF and Alaska Railroad information concerning existing geologic conditions along highways and railroads that are within the alternative corridors
- discussions with local experts on seismicity and paleontology

Fieldwork was limited to site visits and overflights by fixed-wing aircraft for resource verification only. Maps depicting geologic resource constraints were developed using 1:25,000 scale topographic base maps of each route. Resource data were entered into a geographic information system (GIS) for display and analysis. For the purpose of identifying potential hazards to the proposed Project, geologic units prone to certain hazards (e.g., ground failure or slope instability) were separated from other units on Figures MV-2 through MV-4.

Inventory Study Methods – Water Resources

The analysis of water resources first involved a review of the regional physiographic setting of the study area. The regional overview was followed by a more specific investigation and evaluation of resource features. Results of the evaluation are presented in Chapter 3.

Information was obtained and reviewed from various federal, state, and local agencies, including the following:

- USGS water resources data
- aerial photographs (1996) at a scale of 1:2,000 (1 inch equals 2,000 feet) flown along the alternative routes
- Flood Insurance Rate Maps published by the U.S. Federal Emergency Management Agency showing flood hazard zones
- ADOT/PF and Alaska Railroad information concerning flood hazards along highways and railroads that are within the alternative corridors

Maps depicting water resource constraints were developed using 1:25,000 scale topographic base maps of each route and are shown on Figures MV-2 through MV-4.

Impact Assessment Methods

Because of the similarity and interrelationships between the resources, the assessment of impacts on geologic resources and water resources are described together in Chapter 3. Similarly, these resources are mapped together along with marine resources on Figures MV-2 through MV-4. The study included an analysis of potential impacts on surface water and soil, as well as potential hazards to the Project from geological and marine conditions. Hazards are presented for alternative routes in Chapter 2. The following environmental features and hazards were analyzed:

- stream and rivers
- 100-year floodplains
- areas subject to high erosion potential
- areas with boulders moved by sea currents and sea ice rafting
- submarine areas prone to ice scour or impact from ice floes and pressure ridges
- areas prone to seismically induced ground failure
- potentially active faults and geologic structures
- surficial deposits prone to slope failure or slope instability (including bluff erosion)
- near coast mudflat erosion from trenching
- compressible soils subject to high settlement

Construction of the project could result in increased soil erosion, thereby affecting water quality. Areas prone to increased soil erosion include areas with highly erosive soils, surficial soils prone to slope instability or slope failure (including bluff erosion), and stream crossings. Water quality also may be degraded by accidental spills of petroleum products, solvents, or other construction-related materials at or near stream crossings as well as in the submarine areas. The use of select backfill in near-coast mudflat trenches could cause preferential flow pathways and increase erosion or sediment load. Construction in areas with compressible soils that are subject to settlement may result in compaction of soil structure, causing long-term damage to soil properties including fertility, water holding capacity, hydraulic conductivity, and bulk density. Soils in fragile muskeg or floodplain areas may require several years to fully recover from compression. Water quality could be affected if a submarine cable (with oil) ruptured or cracked, thereby releasing oil into the waterway. The line could be subject to rupture, cracking, or breakage from earthquake, hazardous seafloor conditions, marine currents, and sea ice movement. With the application of selective mitigation measures, impacts may be reduced or avoided.

MARINE

Inventory and Assessment Study Methods

Information about the marine environment was obtained primarily through an extensive marine geophysical survey conducted in Turnagain Arm from July 8, 1996 to July 13, 1996 by Power Engineers, Inc. and Golder Associates, Inc. During the survey, bottom profile, side scan sonar, sub-bottom profile, and deep seismic reflection data were collected along the following routes:

Route	Link(s)
Pt. Woronzof to Fire Island's North Side	T14
Fire Island's South Side to Pt. Possession (Moose Point Light)	T10
Pt. Campbell to Pt. Possession (near Tesoro Pipeline)	T16 and T17
Potter to South of Burnt Island	E13

The results of the hydrographic surveys are presented in the *Southern Intertie Environmental Assessment/Environmental Impact Statement and Preliminary Engineering Final Hydrographic Survey Report* (Power Engineers 1999).

Information also was obtained and reviewed from various federal, state, and local agencies, including the following:

- NOAA nautical charts pertinent to marine portions of the routes

Fieldwork was limited to site visits and overflights by fixed-wing aircraft for resource verification only. Maps depicting marine environment constraints were developed using 1:25,000 scale topographic base maps of each route. Resource data were entered into GIS for display and analysis. For the purpose of identifying potential hazards to the proposed Project, geologic units prone to certain hazards (e.g., ground failure or slope instability) were separated from other units on Figures MV-2 through MV-4.

BIOLOGICAL RESOURCES

Inventory Study Methods

Key wildlife resources within the study area for which data were available were mapped using an ArcInfo GIS. Resources mapped included:

- anadromous fish streams
- recently and/or historically active bald eagle nests
- nesting and staging areas for trumpeter swans, ducks, and geese
- brown bear feeding and concentration areas
- relative abundance areas of lynx, wolf, and moose
- caribou herd distributions
- beluga whale habitat

Location data were obtained from existing GIS databases, low-level aerial surveys, ground surveys, published reports, resource atlases, and interviews with wildlife agency personnel. Information on abundance and distribution of wildlife species was gathered from ADF&G wildlife resource atlases, published literature, unpublished agency reports and survey data, and interviews with biologists from the USFWS, National Marine Fishery Service, KNWR, Chugach State Park, Chugach National Forest, and ADF&G.

Habitat maps for waterfowl, bald eagles, and large mammals were being developed by the Municipality of Anchorage for the greater Anchorage area at the time of this writing, but were in preliminary draft form. These preliminary habitat maps of Anchorage delineate habitat quality and wildlife use and abundance relative to other areas in Anchorage and are not directly comparable to similar categories on the Kenai Peninsula. Urbanization of much of the study area within Anchorage has degraded the quality of habitat in many areas, although some areas of open space, such as Kincaid Park, Klatt Bog and Connors Bog, continue to provide important habitat for some species. Therefore, information from preliminary maps combined with the distribution of open space, or areas of low density development, were used to characterize wildlife habitat in Anchorage.

Two types of vegetation maps were prepared: one to show the general character of vegetation within the northern Kenai Peninsula and one to evaluate type of landcover traversed by each of the alternative routes and serve as a basis for habitat evaluation for wildlife species. Vegetation along each of the alternative routes was mapped within a 1-mile-wide corridor, 0.5 mile on either side of the centerline, for each alternative route, using true-color aerial photography at a scale of

1:2,400 (1 inch = 2,000 feet). Wetlands within the study area have been mapped on 1:63,360-scale (1 inch = 1 mile) quadrants for the Kenai Peninsula and on 1:25,000-scale (1 inch = 0.4 mile) quadrants for the Anchorage area by the USFWS NWI (USFWS 1982, 1994). The classification system used by the USFWS follows Cowardin et al. (1979) and defines wetlands according to ecological characteristics.

A total of 19 map units were developed using the Alaskan Vegetation Classification, Level IV (Viereck et al. 1992) where possible, and incorporating wetland types based on NWI wetland maps (Cowardin et al. 1979). After initial mapping of vegetation cover types on photos and ground verification in 1996, map units were transferred onto topographic quadrangle maps (1:25,000) and entered into the GIS. GIS centerline reports, summarizing the length of intersection with vegetation and wetland types, were generated for each alternative.

In order to assess the environmental consequences of the Applicant's proposal, an evaluation of potential impacts on vegetation and wildlife resources was conducted. The ultimate goals of the analysis were to identify impact types, duration, and significance; and possible mitigation scenarios that could be applied to reduce impacts to a more acceptable level. The analysis was conducted on a link-by-link basis, to eventually allow comparisons of impacts on individual links, route segments, and complete routes between the Kenai Peninsula and the Municipality of Anchorage.

The following sections describe the methods utilized in the assessment, the rationale for the methods employed, and a general analysis of impacts.

Issue Identification

Biological resources of particular concern were identified as a result of meetings with land and wildlife management agency personnel, reviews of pertinent regional literature, and comments received from the public and special interest groups. In addition to identifying species and habitats of concern, specific issues associated with those resources were defined. Concerns and issues associated with wildlife species and habitats in general were also identified.

Wildlife of concern included the following:

- anadromous fish
- waterfowl
- trumpeter swan
- bald eagle
- wolf
- Canada lynx
- black bear
- brown bear
- beluga whale
- moose
- caribou

In addition to this group of high profile biological resources, concern also was expressed for neotropical migratory birds, waterbirds in general, raptors, small mammals, and marine mammals. The value of specific vegetation and aquatic communities as habitat for wildlife in general also was described.

Issues associated with potential impacts on biological resources of the Project area include the following:

- Loss of habitat due to right-of-way clearing
  - direct resource loss including nesting and foraging habitat for forest nesting birds, loss of important forage species (e.g., devils club) for brown and black bears, and loss of vertical cover important to a number of species
  - fragmentation of habitat on a local level, as well as contributing to habitat fragmentation on the Kenai Peninsula in general
  - creation of additional forest edge effect
  - creation of barriers to wildlife movement

- Creation of improved public access into areas that are presently difficult to reach
  - increased harvest of large mammals and other high profile species
  - increased potential for encounters between humans and brown bears, resulting in disturbance to bears and/or increased bear mortality through defense of life and property
  - increased potential for intentional and unintentional disturbance of all classes of wildlife via winter snow mobile/machine use

- Creation of wildlife hazards not currently present in the environment
  - potential collision hazard created by the presence of overhead transmission lines that could affect ducks, geese, trumpeter swans, bald eagles, and other birds

- Creation of obstacles to wildlife management goals and objectives
  - presence of a wood pole electrical transmission line that could compromise moose management objectives by precluding prescription burns in some areas.

<u>Impact Assessment Methods</u>

Impact Types

Three general categories of impacts were identified—direct, indirect, and cumulative. Direct impacts are caused by the action (i.e., construction) and occur at the same time and place. Indirect impacts are caused by the action, but later in time or farther removed, which are reasonably foreseeable. Indirect impacts could include growth inducing effects, changes in land use, or increased contact between humans and wildlife. Cumulative impacts are impacts that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Impacts also are described as either short-term or long-term impacts. Short-term impacts are those that may occur during construction of the transmission line and related facilities. Long-term impacts are those that could occur as a result of maintenance activities and the presence of the transmission line and associated facilities.

Identification of Impacts

The first step in the impact analysis was to identify potential impacts related to Project construction, maintenance, and facilities, for each resource of concern. The impact analysis was conducted at a general and a site-specific level. Site-specific analyses involved assessing impacts on selected resources for which there were sufficient site-specific data to map the resources along the alternative routes. Selected resources include all vegetation and aquatic communities present along the alternative routes, as well as some important habitats for wildlife of concern, such as seasonal feeding, staging, or concentration areas; and nesting or spawning areas.

Impact Significance

Determination of significance is an essential and integral part of assessing impacts on biological resources for the Project. Impact significance is dependent on the sensitivity of a resource to project-related impacts and the context of those impacts. Sensitivity of vegetation and wildlife resources can be described based on the following criteria:

- Legal status or protection of the resource or associated species – Species that are legally protected include those that are listed as threatened, endangered, candidates, or proposed for listing under the Endangered Species Act of 1973 as amended; those that are listed by the State of Alaska as Endangered or Species of Special Concern; and those protected by other legislation, such as the Bald Eagle Protection Act, Migratory Bird Treaty Act, and Marine Mammal Protection Act. Community types that are legally protected include wetlands and waters of the United States as directed by Section 404 of the Clean Water Act.

- Susceptibility to the kinds of impacts associated with the Project – Highly susceptible resources are those for which project-related impacts could result in disturbance, injury, death, or decreased productivity. Resources with low susceptibility are not expected to be disturbed or otherwise harmed by Project-related impacts.

- Value and quality as wildlife habitat – Resources are considered of high value if they are characterized by high species richness and/or provide critical resources for species of concern. Resources of low habitat value support relatively few species, none of which are particularly sensitive.

- Availability of resource within the Project study area – Resources are highly available if they are widespread within the Project study area. Conversely, resources were considered to be of low availability if they are of limited distribution in the Project study area.

For example, brown bear summer feeding areas are not legally protected as defined above. They could be highly susceptible to project-related impacts, such as disturbance during construction and increased human/bear interaction resulting from improved access over the long term. Brown bear summer feeding areas include all anadromous fish streams within the Project study area; however, the quality of these streams as brown bear summer feeding habitat could depend on anadromous fish numbers, levels of human disturbance, and accessibility to fish. Anadromous fish streams that provide good quality summer feeding habitat for brown bears are of relatively low availability within the Project study area. Based on the criteria outlined above, these resources are, therefore, considered sensitive to project-related impacts.

Impact significance is evaluated within three levels of context—local, regional, and national. The local context for this Project is defined as the immediate vicinity of the alternative routes. The regional context depends on resource distribution and interactions. For example, the regional context for evaluation of impact significance on brown bear resources would be the Kenai Peninsula, because the population of brown bears on the Peninsula are believed to experience little, if any, immigration from or emigration to other brown bear populations. A national context considers resource status at the national level, and federal mandates for resource protection. For example, wildlife within the KNWR are considered a national resource due to the USFWS mandate to protect wildlife. Adverse impacts on wildlife within the KNWR are considered nationally significant.

Impacts on a resource could be significant on a local scale, but insignificant on a regional scale if the resource is widely distributed on a regional basis. Likewise, an impact on a resource that is significant at a regional level could not be significant at a national level if regional impacts do not adversely affect the status of the resource nationally, or interfere with federal protection mandates. For example, increased access as a result of the Project could have a significant impact on brown bears at a local level due to potential increase for human/bear interactions in the vicinity of the alternative routes. Such impacts could be regionally significant if they have an adverse effect on brown bears at the population level on the Kenai Peninsula. Adverse impacts on the Kenai Peninsula population of brown bears would not likely affect brown bears at a national level; however, adverse impacts on the species that take place within the KNWR would be nationally significant due to the federal mandate to protect wildlife.

LAND USE AND RECREATION

Inventory Study Methods

This section describes the land use inventory and analysis conducted to assess the potential sensitivity of identified land uses to the construction, operation, and maintenance of the proposed transmission line and associated facilities. Land use data were collected within 4-mile-wide study corridors, 2 miles wide on each side of the assumed centerlines. This was accomplished by reviewing, refining, and updating data accumulated from previous *Southern Intertie Route Selection Study* (Power Engineers 1996a) studies. Aerial photography flown in May and August of 1996 at a nominal scale of 1:2,000 (1 inch = 2,000 feet) was interpreted for the 4-mile-corridor width. Photography at a scale of 1:500 was used for detailed land use investigations in Anchorage, Soldotna, and Nikiski. All mapped data from aerial photography were verified in the field. Field investigations for land use and recreation were conducted from August to September 1996 for all alternative corridors and updated in April 1999. In February 2001, data were updated wherever possible with winter weather conditions. Agency contacts were conducted to obtain and/or confirm specific land use and recreation data. Federal, state, regional, and local governmental agencies and organizations were contacted through telephone, letter, or meetings to collect and discuss data.

Detailed data were collected, compiled, and mapped on USGS 1:25,000- and 1:63,360-scale topographic quadrangles and verified with existing GIS data obtained from the Municipality of Anchorage, Kenai Peninsula Borough, and Chugach National Forest. Secondary sources provided additional data for this inventory. Data sources included governmental agencies, private enterprises, and special interest groups in the form of maps, pamphlets, brochures, environmental impact statements, and planning reports.

The land use inventory section is divided into the following three major components to document surface land uses, legislative designations, and land management policies that occur within the alternative study corridors:

- land jurisdiction and management plans
- land use
- alternative affected environment/environmental consequences

The following figures, located in the EIS, should be reviewed along with each of these sections:

- Figure MV-18, Jurisdiction/Ownership
- Figure MV-19 and 20, Land Use
- Figure MV-21, Land Use (Anchorage Area)
- Figures MV-22, 23, Recreation Management Areas
- Figures MV-24, 25, 26, Recreation Use Areas

Impact Assessment Methods

The land use impact assessment model included three assessment variables for assessing impacts: resource sensitivity, resource quantity, and duration of impact. These three variables resulted in the assessment of an initial impact to each land use category. Once initial impacts were established along the routes, specific measures for mitigating or reducing these impacts were applied. The residual impact represents the potential impact that could be expected to occur, after mitigation, if the proposed Project were constructed along a given route.

Impact Significant Definitions

Resource sensitivity established during the Phase I feasibility study was the primary element in determining initial impacts for land uses. The presence or absence of existing parallel transmission lines or pipelines modified the sensitivity level, while ground disturbance quantified the area of impact. In addition, site-specific circumstances were considered, and in some cases modified the impact significance. Agency, CWG and public concerns helped determine site-specific factors.

Significant impacts were assigned to those categories where the officially stated or approved land use restriction, plan, or policy would be violated, or where land use sensitivity was moderate but modified by the lack of existing linear features

For a particular land use feature or area of affected resource, only the impact within the assumed centerline of each alternative route was assessed.

Impact Types

Types of potential physical impacts on land uses in the study area are physical restrictions to residential, commercial, and industrial uses. These impacts would be long term, and would include limitations on future urban development, planned subdivisions, and potential conflicts with local land use plans and policies. Impact significance was assigned assuming Project construction utilizing 230kV X-frame, H-frame and single-pole structures, in addition to underground and submarine cables. Within the study area, significant and potentially significant impacts were initially identified for the following situations:

- those areas where the transmission line would require an additional new right-of-way in an existing recreation area or subdivided residential areas occupied by residences
- those areas where severance of currently vacant parcels could prohibit future development
- residential areas where the Project would prohibit use of a recreation area or physically conflict with existing residences or planned subdivisions at the final approval stage
- those areas where the project would physically interfere with recreation activities or create a direct conflict with commercial, industrial or transportation uses

In this study, long-term is used to characterize impacts continuing after construction while short-term is for impacts that would be limited to construction. Most impacts in this study are expected to be long term, lasting for the life of the Project. However, changes in development plans necessitated by placement of a transmission line across or bordering a parcel are seen as short term.

Direct impacts on recreation uses pertain to physical or operational effects of the proposed Project on recreation resources. Physical impacts include restrictions to existing facilities and uses, and right-of-way restrictions to the occupied land. These impacts would be long term, and would include limitations on future facilities or expansion of existing sites. Direct effects also can include changes in scenic qualities or attributes, particularly in remote natural settings. Only physical impacts on recreation uses occurring within the right-of-way were determined for this analysis. Visual and aesthetic impacts are described in the visual resources section.

Indirect effects of transmission lines on recreation resources include potential displacement or concentration of recreation users. The presence of a transmission line may displace those recreation users who find the presence of line intrusive, or the presence of the line may attract users who seek the transmission line corridor as a means of access. This type of an effect could occur on either the Tesoro or Enstar routes. Impact types identified for recreation uses included impacts that:

- alter or otherwise physically affect any established, designated or planned recreation, preservation use area, or activity

- affect any officially adopted policies or goals of the affected land-managing agency

- increase or decrease accessibility to any area established, designated, or planned for recreation or preservation use

SOCIOECONOMICS

Inventory Study Methods

Demographic and economic information for the study area was gathered primarily from secondary sources including state land use plans, local government comprehensive plans, community profiles, and other statistical reports, including the following:

- Alaska Department of Community and Regional Affairs Community Profiles
- Alaska Department of Labor Population Reports
- Alaska Department of Labor Economic Reports
- Municipality of Anchorage, Anchorage Indicators 1996 and 1997
- Municipality of Anchorage Comprehensive Annual Financial Report 1996
- Kenai Peninsula Borough Comprehensive Annual Financial Report 1995
- Kenai Peninsula Borough Coastal Management Program Final Document 1990
- 1990 U.S. Census Data

Impact Assessment Methods

A socioeconomic impact assessment assesses the social and economic impacts of a proposed project on the local population and the significance of those impacts, and recommends measures to avoid and mitigate adverse impacts. A project's effects can be a mixture of beneficial and adverse changes in living conditions and quality of life, and may be temporary or permanent.

Projects to develop infrastructure or other physical resources affect the human environment in a variety of ways. Demographic and economic changes during the construction of transmission lines, substations, and other facilities are generally the principal impact. New construction activities set off changes in employment, income, demand for public and private services and, through alteration in land uses, changes in living patterns.

Impacts are assessed by comparing the likely changes the proposed action would cause to the local socioeconomic setting with current conditions (the baseline or "no-action" alternative). The socioeconomic baseline for the Project region is presented in Chapter 3. It includes trends in population, employment, housing, public services, and fiscal sector characteristics. This section will describe the proposed Project's activities and associated socioeconomic effects, and will project how the local population's living conditions and quality of life might change.

Socioeconomics is not an exact science. People's behavior in reaction to the introduction of transmission system construction activities and facilities is difficult to predict. There are regional economic impact modeling methodologies that are helpful in estimating the secondary effects of introducing new money into a local economy. Alaska, however, has a significant seasonally fluctuating workforce and a highly seasonal tourism and recreational market. Therefore, predictions of multiplier effects on local area employment and income due to short-term changes in construction employment and spending are very speculative.

Socioeconomic effects operate at two levels. These levels are the "macro" level of system-wide operating benefits accruing to the customers of the Railbelt Utilities, and the "micro" level of impacts on the residents living near Southern Intertie Project's facilities. At the macro level, Railbelt power customers would benefit from the increased reliability of service made possible by the additional transfer capability between the Kenai Peninsula and Anchorage. Some cost savings would likely develop, which could be translated into rate reductions, but the major benefit would be the avoided costs of power interruptions and associated economic losses. [1]

Both short-term and long-term socioeconomic effects must be considered. The Project would generate new short-term jobs and wage income for some Alaska residents. The Project would also provide a temporary increment of demand for worker consumption and Project construction goods and services in the Anchorage and Kenai Peninsula areas. Local merchants and businesses

[1] Average rate reductions of 0.16 cents and 0.21 cents per kWh, respectively, are predicted for the Tesoro and Enstar route alternatives over the 40-year life of the Project, which would be equivalent to a saving of about $1 dollar per month for the typical household's power bill. This is too small to have a noticeable effect on the state economy. Sub-Section 4.7.3, below, presents a digest of the rate impact analysis provided in Chapter 1.

would benefit from these short-term impacts. The Project could disrupt recreational activities in the Kenai Lowlands by providing workers who would compete with visitors and tourists for transient accommodations during the summer season. Over the long term, the Project's micro, or local, level socioeconomic effects would be primarily fiscal, in the form of payments for rights-of-way, taxes, and fees to local jurisdictions. Long-term operations and maintenance activities would have no discernible impacts on local community life due to their very small staffing requirements and the relatively infrequent need for surface access to facility sites.

The most critical issue is how communities and residents near the Project right-of-way and along work site transportation routes would accommodate construction logistics. Worker lodging in the lowlands region of the northern Kenai Peninsula is of particular concern because of potential competition between workers and tourists for campsites and other lodging. Other potential issues include impacts on tourism attractions and on property values, environmental justice, and cumulative effects of the proposed transmission line development in conjunction with other major projects.

Central to an impact assessment is determining the significance of its effects. There are no legislative or regulatory criteria for establishing the "significance" of a socioeconomic impact, and most practitioners of the social sciences avoid quantifying the thresholds of "goodness" or "badness." For example, a high level of unemployment is "bad," but the precise level is subject to debate, and it can be difficult to estimate how a proposed construction project may affect such conditions. It is possible, however, to evaluate localized impacts of an individual infrastructure construction or resource development project and make some judgments regarding the potential significance of an impact. One commonly accepted indicator of socioeconomic stress is the housing vacancy rate. When it falls below 5 percent, the housing market is "tight," with excess demand for living accommodations and supporting infrastructure and services. In other words, there are more people in the area than it can comfortably support in the near term. Another indicator is the area's ability to accommodate visitors, reflected in transient accommodation supply and demand. This is probably the primary criterion for assessment of the significance of a construction project's impacts on the human environment. This issue was considered as part of the study's socioeconomic investigation.

Effects

Overall Project Expenditures and Workforces

Socioeconomic impacts are caused by changes in utilization of people and material resources. One focus of the analysis is to determine the demand for community resources such as housing, utilities, and other public services during construction, operation, and maintenance of the Project. During construction, the Project would generate between 85 and 90 person-years of direct construction employment (full-time equivalent with 60-hour workweek) during the spring 2002 to fall 2003 period, which would yield around $8.75 million in direct wages and salaries. Another $50+ million is projected to be spent for equipment, materials, and construction goods and services. Operations and maintenance activities would have no discernible impacts on local community life due to their very small staffing requirements and the relatively infrequent need for surface access to facility sites.

The Project consists of two basic alternative routes (each with variants) with transmission facilities to be located in the municipality of Anchorage, the Turnagain Arm area, and the northern lowlands part of the Kenai Peninsula. The Tesoro Route commences near Nikiski, runs along the northwestern shore of the Peninsula to Pt. Possession, crosses Turnagain Arm underwater, and terminates in western Anchorage at the Point Woronzof Substation—a distance of 61.3 miles. The Enstar Route commences near Soldotna (Kenai) and proceeds inland northeasterly up the peninsula, crosses Turnagain Arm underwater, and terminates in Anchorage at the International Substation—a distance of 73.4 miles.

Determining whether concentrations of workers and construction activities might stress local communities involves reviewing the timing and location of deployments of workers and local spending (by workers as well as by the Project). Because the Project has not gone out to bid, there are no data on how much work would go to Alaska-based contractors or how they might recruit their workforces (local residents versus outsiders). In a typical project, major parts of the overhead transmission line, submarine cable; and substation construction components typically are contracted to firms of national or even international scope, with local contractors being subcontracted for traditional tasks like site preparation, trenching; and foundation work. Because of the highly specialized nature of power transmission systems and their construction requirements, particularly the submarine cable segments of the Project, it can be expected that many of the supervisory personnel and skilled trades specialties would be hired from out of state. The contractors would be interested in maximizing the hiring of local workers in order to minimize relocation costs, but the more specialized skill requirements would probably have to be recruited elsewhere in order to ensure that the Project is adequately staffed and that completion deadlines would be met. The Project's consulting design engineers estimate that approximately half of the manpower would be recruited from out of state (Power Engineers 1997a). Therefore, approximately 45 of the 90 worker-years of employment would be completed by out-of-state workers. Such personnel would reside in Alaska only during their specific work phases. A similar number of person-years of work would go to residents of the Anchorage and Kenai Peninsula areas.

Much of the equipment, conductors, control systems, and other electrical components would likely be imported from out of state. Local vendors, on the other hand, would be expected to supply the Project's basic construction materials and logistical services. The Project's consulting design engineers estimate that most of the non-labor procurements—about 85 percent—would be made out of state.[2] Accordingly, such non-local procurements of materials, equipment and other construction services would constitute around $42.5 million of the $50+ million of the Project's non-labor expenses, with the balance of approximately $7.5 million accruing to local suppliers and vendors of construction goods and services.

[2]Source: Power Engineers, Inc. 1997a. Total costs of the Project are outlined in Chapter 1 of the report.

Project Scheduling and Location Factors—An Overview of Project Logistics

The foregoing numbers provide part of the basis for estimating the economic forces that would act on communities along the Project right-of-way during construction. The other part of the analysis is the timing of construction activities. Much of the construction work on the Kenai Peninsula would be completed during winter months to reduce potential impacts on environmental resources.

Figure C-1 provides an overview of the projected monthly manpower loading levels for construction of the two alternatives. The bands depict the average number of workers per month for each route, including all aspects of the Project (i.e., Kenai Lowlands, Turnagain Arm, and Anchorage Bowl segments for power lines, substations, submarine crossings, etc.); subsequent figures break out each area's loading. Figure C-1 shows the period beginning year 1 through end of year 2.

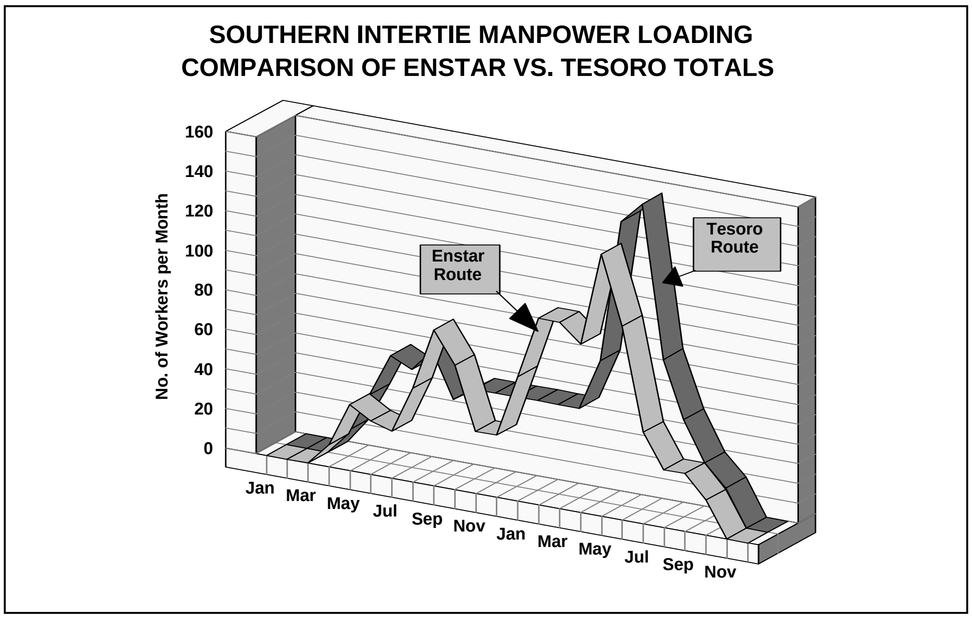

Figure C-1

The Tesoro Route is projected to have a peak summer loading of around 60 workers in construction year 1, declining to about 45 during the winter, but rising to a peak of approximately 155 workers in construction year 2. The workload then declines, with work completed by fall of year 2. The Enstar Route's manpower loading rises in the first year to a summer peak of approximately 80 workers, then declines to around 30 in early winter, but rises to over 90 by spring of year 2; the loading continues to rise to its second year peak of about 135 workers in the summer. The pattern of winding down in the summer and fall of year 2 is relatively linear for the Tesoro Route, whereas the Enstar Route has a step in its manpower loading during the summer due to the greater length of its Anchorage Bowl overhead cable segment.

Numbers of workers vary according to the phase of work and the precise route option being implemented in a segment. Based on the design engineers' estimates of work scheduling and crew sizes, the number of workers involved in the overhead cable portion of the Kenai Lowlands segment could be 95 persons on the Enstar Route (in early year 2). The Tesoro alternative's peak would be around 65 workers, occurring in the summer of year 2, following a constant level of 45 workers on the peninsula during the winter and early spring months. For either alternative, the overhead cable work would proceed continuously from summer of the first year through winter, spring, and summer of year 2. Work on other components would be undertaken only during the warm weather months.

The Tesoro Route's underground cable sections and associated transition facilities on the Kenai Peninsula would employ approximately two dozen workers during each of the warm weather seasons of both years. The Enstar Route has a smaller component of these facilities, and would employ only about a half-dozen workers on the Peninsula during the spring and summer of the second year. Construction and modification of substations on the Kenai Lowlands and in the Anchorage Bowl would employ an additional one to two dozen workers at the several sites along the rights-of-way for both routes (Power Engineers 1997a). Construction of the submerged cable segment across Turnagain Arm for either alternative would require 55 to 75 workers at the time of maximum effort in late spring of the second year. Finally, in the Anchorage Bowl area, two to three dozen workers (depending on the route) would be involved in constructing the underground and overhead cable sections of the transmission line.[3]

It is difficult to be precise about the timing and location of worker requirements for transient accommodations, which is the critical issue for communities near the Project right-of-way in the Kenai Lowlands region. The communities of Soldotna, Kenai, Nikiski, Sterling, and Cooper Landing would be particularly affected (some more than others, depending on the route option selected). With the May through September construction season coinciding with the peak tourist and recreation season, operators of motels, recreation vehicle parks, and campgrounds in the northern part of the Kenai Peninsula could encounter increased demand for sites from the workers at the same time as they are serving the traditional high season customers. Displacement of traditional motel, recreational vehicle park, and campground users by transmission project workers is an issue that must be assessed in view of the potential for the disruption of business and personal relationships among residents and visitors to the northern Kenai area.

[3]The Tesoro route into the western end of the city involves mainly submerged and buried cable terminating at the Pt. Woronzof Substation. The Enstar route has a short length of underground cable where the line comes ashore at the eastern end of the city, but several miles of overhead cable follow it to the International Substation.

VISUAL

This section provides a description of visual inventory and impact assessment methods for the Project.

Visual Inventory Study Methods

The visual resources inventory consisted of a regional overview and a detailed evaluation of the alternative routes within the study area. The inventory is consistent with the principles of the Scenery Management System established by the U.S. Forest Service (1995).

The inventory was conducted over a span of a year from 1996 to 1997 and updated in 2001 by a team of landscape architects specializing in visual resources assessment. The *Southern Intertie Route Selection Study* (Power Engineers 1996a) provided an initial basis for the visual resources inventory. Studies included field observations during all four seasons of the year, and the team met with the public and agencies to review key issues, management strategies, and inventory requirements as well. Data were collected through agency contacts, public and community working group meetings, analysis of tourism information, existing mapped data, and aerial photography interpretation. In addition, extensive ground and air reconnaissance were conducted in support of these efforts.

The purpose of the visual resources inventory was to identify and document landscape scenery and views along the alternative routes. The majority of the Project area outside of Anchorage is rural and undeveloped, including the KNWR, portions of the Chugach National Forest, coastal edges of the Cook Inlet, and Turnagain Arm. Urban settings include the Anchorage area and the communities of Soldotna, Sterling, and Nikiski. Since the study area includes both rural and urban settings, the inventory was designed to respond to both. Outside of Anchorage, a 4-mile-wide corridor, 2 miles on each side of an assumed route centerline, was inventoried. Within Anchorage, characterization of alternative routes was based on a general study of the urban setting and a detailed study within a 0.25-mile-wide corridor (660 feet on each side of an assumed route).

Landscape Scenery

The inventory of rural areas was based on the premise that each characteristic landscape (i.e., mountains, lowlands, coastal areas, and water) exhibits its own type of scenic quality. Landscape scenery within the rural settings of the Anchorage Bowl, Chugach Mountains, Kenai Lowlands, Cook Inlet, and Turnagain Arm is defined by the landscape character and levels of scenic quality inherent to each area. Within the urban settings of Anchorage, Soldotna, Sterling, and Nikiski, landscape scenery is based primarily upon the visual image of the built environment. Existing visual conditions (e.g., the presence of existing transmission lines) that may affect the scenic quality or visual image of an area also were considered in the evaluation of landscape scenery.

The landscape character type of each rural and urban setting of Anchorage and the Kenai Peninsula consists of distinct elements that create a visual and cultural image both individually and as a region. This image or “sense of place” for the region is a combination of physical, biological, climatic, and cultural attributes that make the area identifiable and unique.

Scenic Quality

In the rural setting, scenic quality was determined by evaluating landscape character type based upon the uniqueness and diversity of landform, water, vegetation, cultural features, and influence of adjacent scenery. Higher scenic quality occurs in landscapes with a greater degree of naturalness, diversity of features, and uniqueness. Ground surveys and overflights of the study area were conducted to document conditions and determine levels of scenic quality including Class A, lands of outstanding or distinctive scenic quality; Class B, typical scenic quality; and Class C, indistinctive scenic quality.

Visual Image Types

In urban areas (i.e., Anchorage and portions of Soldotna, Sterling, and Nikiski) landscape scenery was defined by visual image types. The purpose of characterizing the types of existing and planned visual images in proximity to the alternative routes was to determine the compatibility of the proposed transmission line in these urban settings. Anchorage, in particular, is rapidly changing and evolving. Urban patterns once associated with past development are now being replaced through comprehensive planning efforts that focus on aesthetics as evidenced by the “visioning” process in Anchorage (1997).

Image types consist of development patterns that are defined by planning concepts (circulation and building types), visual character (landscape design and architecture), and viewer orientation (viewer position relative to the location of the proposed Project). Four major image types were identified based upon the review of aerial photographs, existing and proposed land use information, and field studies. These image types included residential, park-like, commercial, and industrial areas.

Existing Visual Conditions

The scenic quality of rural areas and the visual image of urban settings may be modified locally by the presence of facilities including transmission lines, overhead lighting, signage, pipelines, and other features that affect landscape scenery. The existing visual conditions for each alternative were evaluated through field review in order to determine those locations where modifications would influence scenery. Examples of these locations include the Old Seward Highway and North Kenai Road, where the setting has been modified by the presence of existing transmission line(s), among other discordant modifications.

Views

The inventory of views included three components: (1) the identification of key viewpoints and viewing areas, (2) viewer sensitivity, and (3) the viewsheds from these locations including distance and screening potential from sensitive viewing areas.

Key Viewpoints and Viewing Areas

Numerous key viewpoints and viewing areas were identified and mapped in coordination with land use investigations, including individual residences and communities, recreational areas (e.g., parks, visitor centers, campgrounds, picnic grounds, trailheads, marinas, and resorts), and travelways (e.g., highways, roads, railroads, and trails). Of particular importance were those locations where dominant regional landscape features could be viewed in the context of the larger setting, such as views from areas along the coastline of the Cook Inlet including Captain Cook State Recreation Area (SRA), Pt. Woronzof, and Kincaid Park on Pt. Campbell. More localized views of importance, within the KNWR, include views along the Moose River, Afonasi Lake, and along the Mystery Creek Road and the Enstar pipeline. These areas are often views in context of the regional setting from flights both for recreational purposes and sightseeing.

Viewer Sensitivity

Viewer sensitivity is a measure of the degree of concern for change in the scenic quality of the rural landscape or to the visual image of an urban setting. Viewer sensitivity was determined through discussions with the public, the community working group, agency contacts, and field observations.

Viewsheds

***Viewsheds consist of two components*—**distance zones and screening. A viewshed is the visible portion of the landscape seen from a viewpoint or viewing area. Viewpoints and viewing areas mapped within the study area were modeled using digital terrain data obtained from the U.S. Geological Survey (USGS).

Distance Zones—Distance zones were mapped for each viewpoint or viewing area. Typically, in the foreground (0 to 0.4 km [0 to 0.25 mile]), individual objects are seen in detail, whereas the middleground (0.4 to 4.8 km [0.25 to 3 miles]) is an area where objects are typically viewed in relationship to patterns rather than emphasizing individual features. In background areas (4.8 to 24.1 km [3 to 15 miles], or further) landscapes are viewed as horizon lines and tones where atmospheric conditions often dominate.

Both local and extended views have been incorporated into the viewshed analysis. In order to display local views, a limit of 1 mile was placed on the extent of the middleground computer viewshed analysis for both the views from residences and views from recreation areas. In addition, areas where the alternative route may be viewed from distant residences were determined through field review.

Foreground viewsheds have been grouped into two zones: immediate foreground (0 to 91 meters [0 to 300 feet]) and foreground (91.4 meters to 0.4 km [300 feet to 0.25 mile]) in order to differentiate the degree of influence of the proposed transmission line structures. In the immediate foreground, structures would be most dominant, and would continue to dominate up to 0.4 km (0.25 mile). In summary, distance zones for local viewsheds include the following:

- immediate foreground (IFg): 0 to 91.4 meters (0 to 300 feet)
- middleground (Mg): 0.4 to 1.6 km (0.25 to 1 mile)
- foreground (Fg): 91.4 meters to 0.4 km (300 feet to 0.25 mile)
- background (Bg): beyond 1.6 km (1 mile)

Screening Potential—There are certain cases where discrete terrain conditions create additional screening that is not accounted for in viewshed modeling due to the level of terrain data available from the USGS. These cases along with areas screened by vegetation and buildings were identified and documented based on field observation and used to determine where visibility from sensitive viewpoints and viewing areas within the alternative routes would be modified. There are three levels of screening. Open viewing conditions exhibit minimal to no screening; partially screened views include areas where viewing opportunities are intermittent; screened views include areas where terrain, vegetation, or buildings obscure views.

Visual Impact Assessment Methods

Impacts on visual resources were assessed by determining the potential for change to the landscape scenery and views. This section describes criteria, methods, and models used to assess visual impacts of the Project along the alternative study corridors. Key components of the assessment, including visual contrast, visibility, and impact assessment models and assumptions are described below.

Visual Contrast

Visual contrast is a measure of the degree of perceptible change that would occur in the form, line, color, and texture of the landscape as a result of the construction and operation of the proposed Project facilities. Two major components that contribute to the visual contrast include the addition of structural elements in the landscape and removal of vegetation. The levels (strong, moderate, and weak) and types of visual contrast that could result from the Project route options are defined below.

Visual Contrast Levels

- *Weak contrast*—would occur in areas where the proposed transmission line is subordinate to the surrounding setting and does not attract attention

- *Moderate contrast*—would occur where the proposed transmission line begins to attract attention but does not dominate the surrounding setting

- *Strong contrast*—would occur where the proposed transmission line dominates the surrounding setting

Visual Contrast Types

Vegetation

Vegetation contrast would result from the clearing of new right-of-way or widening of an existing right-of-way. Vegetation contrast was determined through an evaluation of the required width of clearing for vegetation types, sizes, and patterns inventoried within the study corridor. Contrast levels were assigned to each vegetation type based on the relative change in appearance of the landscape predicted to occur as a result of right-of-way clearing.

Structure

Structure contrast examines the compatibility of transmission and other ancillary facilities with the existing landscape. Structure contrast is largely dependent on the presence or absence of existing parallel transmission lines in the landscape. Visual contrast is typically the strongest where there are few existing structural elements (e.g., existing utilities, etc.) in the landscape and weaker where existing transmission lines are paralleled.

The range of overall contrast levels that could result from construction of the Project by the combination of vegetation and structure contrast is shown in Table C-1.

TABLE C-1
VISUAL CONTRAST LEVELS

Structure Contrast	Vegetation Contrast		
	Strong	**Moderate**	**Weak**
Strong	Strong	Strong	Strong to Moderate
Moderate	Strong	Moderate	Moderate to Weak
Weak	Strong to Moderate	Moderate to Weak	Weak

Visibility Levels

The visibility of Project facilities depends on the context in which the Applicant's Proposal will be viewed. Although there are many contributing factors, the two major parameters that contribute to the visibility of the Project are distance and screening between the viewer and the alternative route options.

Distance Zones

The appearance and scale of Project facilities in the landscape change with viewing distance and Project type. Lands seen from sensitive viewing areas, identified in the inventory phase of the study, were divided into four distance zones, including (1) immediate foreground, (2) foreground, (3) middleground, and (4) background or seldom seen. Due to landscape characteristics and development patterns, the extent of viewing distance and perception of structural elements within rural landscapes was determined to be generally greater than in urban settings as indicated in Table C-2.

TABLE C-2
LEVELS OF VISIBILITY FOR RURAL AND URBAN AREAS

Screening Potential	Visibility (0 to 300 feet)	Fg (300 feet to ¼ mile)	Mg (¼ mile to 1 mile)	Bg and SS (beyond 1 mile)
Immediate Foreground Rural Visibility Levels				
Open	High	High	Moderate	Moderate/Low
Partially Screened	High/Moderate	Moderate	Moderate/Low	Low
Screened	Moderate	Moderate/Low	Low	Low
Urban Visibility Levels				
Open	High	High	High/Moderate	Moderate
Partially Screened	High/Moderate	Moderate	Moderate/Low	Low
Screened	Moderate	Moderate/Low	Low	Low

Screening Potential

Visibility to and from developed areas and travel routes was determined by the edge conditions bordering individual areas. Edge conditions are described as screened, partially screened, or open conditions. A screened edge condition would block views of the Project. Screened conditions generally consist of topography, vegetation, and/or development that acts as a buffer. Partial screening occurs where there are dispersed patterns of vegetation and development, which are not continuous. Open edge conditions lack any screening.

Impact Assessment

Impact Assessment for Rural Landscapes

In general, significant visual impacts in rural landscape settings are the result of high visibility from sensitive viewing areas such as residences and recreation areas with strong or moderate Project/setting contrast within scenic quality Class A, B, or C landscapes, as shown in Table C-3. Significant impacts also are a result of moderate visibility and strong contrast within scenic quality Class A landscapes.

Potentially significant impacts include areas of high to moderate visibility from sensitive viewpoints where the Project would result in moderate to weak contrast within scenic quality Class A landscapes. Potentially significant impacts also were assigned to a wide range of conditions where the Project would be noticeable and begin to attract attention including middleground views located in areas of moderate contrast.

TABLE C-3
IMPACT LEVELS FOR RESIDENTIAL AND RECREATION VIEWERS IN RURAL LANDSCAPES

	Visibility Levels														
Visual Contrast	**High**			**High to Moderate**			**Moderate**			**Moderate to Low**			**Low**		
Strong	9	8	7	8	7	6	7	6	5	6	5	4	5	4	3
Strong to Moderate	8	7	6	7	6	5	6	5	4	5	4	3	4	3	2
Moderate	7	6	5	6	5	4	5	4	3	4	3	2	3	2	1
Moderate to Weak	6	5	4	5	4	3	4	3	2	3	2	1	2	1	1
Weak	5	4	3	4	3	2	3	2	1	2	1	1	1	1	1
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
	Scenic Quality Class														

Significant Impacts – 7, 8, 9
Potentially Significant Impacts – 4, 5, 6
Non-Significant Impacts – 1, 2, 3

Where structures would be located in conditions that do not attract attention or would be seldom seen, impacts are considered to be non-significant. These include areas where the views are generally beyond 1.6 km (1.0 mile), or screened by vegetation in a middleground setting.

Impact levels for residential and recreation viewers in rural landscapes are shown in Table C-3, which displays the relationship between levels of visual contrast and rural visibility levels.

Impact Assessment for Urban Landscapes

In general, a significant impact is a result of high to moderate visibility and strong or moderate Project/setting contrast within residential and park-like image types. In these settings, the proposed facilities are visually evident in the landscape and are incongruous with the visual image types.

Potentially significant impacts occur in areas where the line is visible but subordinate to the landscape. Potentially significant impacts include areas of strong contrast within open foreground views from commercial/public image types. Potentially significant impacts also were assigned to a wide range of conditions where the Project would be noticeable and begin to attract attention. These conditions include areas with high visibility to areas of strong Project/setting contrast located within commercial/retail image types.

Impact levels for residential and recreation viewers in urban landscapes are shown in Table C-4, which displays the relationship between levels of visual contrast and urban visibility levels based on urban landscape.

TABLE C-4
IMPACT LEVELS FOR RESIDENTIAL AND RECREATION VIEWERS IN URBAN LANDSCAPES

Visual Contrast	**Visibility Levels**																			
	High				**High to Moderate**				**Moderate**				**Moderate to Low**				**Low**			
Strong	9	7	5	3	8	6	4	2	7	5	3	1	6	4	2	1	4	3	1	1
Strong to Moderate	8	6	4	3	7	5	3	1	6	4	2	1	5	3	1	1	3	2	1	1
Moderate	7	5	3	2	6	4	2	1	5	3	1	1	4	2	1	1	2	1	1	1
Moderate to Weak	6	4	2	1	5	3	1	1	4	2	1	1	3	1	1	1	1	1	1	1
Weak	5	3	1	1	4	2	1	1	3	1	1	1	2	1	1	1	1	1	1	1
	R,P	C1	C2	I	R,P	C1	C2	I	R,P	C1	C2	I	R,P	C1	C2	I	R,P	C1	C2	I
	Visual Image Type*																			

*R = Residential P = Park-like C1 = Commercial-office
C2 = Commercial-retail I = Industrial
Significant Impacts – 7, 8, 9
Potentially Significant Impacts – 4, 5, 6
Non-Significant Impacts – 1, 2, 3

Impact Assessment for Travelways

Visual impacts along travelways were assessed separately from rural and urban landscapes. Impacts on views from travelways are largely dependent upon distance, the setting, and orientation to the Project—either parallel or perpendicular to the roadway.

Significant impacts are a result of strong or strong to moderate contrast along a high sensitivity travelway. A high sensitivity travelway would be characterized by an open landscape setting, which offers scenic views to distant or local natural features. Construction of the proposed Project in these locations would interrupt views to natural features and would be one of the few manmade elements visible within foreground views from the road. In this condition, the proposed activity would dominate the landscape.

Potentially significant impacts occur where strong to moderate through moderate to weak contrast occurs within a moderate sensitivity travelway corridor. A moderate sensitivity travelway would be characterized by landscapes that provide intermittent views to distant and local natural features. Development patterns in these areas typically have a fairly unified and organized appearance. Potentially significant impacts are also a result of moderate to weak contrast along a high sensitivity travel route or strong to moderate contrast within a moderate to low sensitivity travel route corridor.

Where structures are located in conditions that do not attract attention, impacts are considered to be non-significant. Non-significant impacts include areas where Project contrast ranges from strong to weak along a low sensitivity travelway. Non-significant impacts also are the result of moderate to weak contrast along a moderate to low sensitivity travelway.

Impact levels for views along travelways in rural and urban landscapes are shown in Table C-5, which displays the relationship between levels of visual contrast and travel corridor sensitivity.

TABLE C-5
IMPACT LEVELS FOR VIEWS ALONG TRAVELWAYS

Project/Setting Contrast	Travel Corridor Sensitivity			
	High	Moderate	Moderate to Low	Low
Strong	8	7	6	3
Strong to Moderate	7	6	5	3
Moderate	6	5	4	2
Moderate to Weak	5	4	3	1
Weak	4	3	2	1

Significant Impacts – 7, 8, 9
Potentially Significant Impacts – 4, 5, 6
Non-Significant Impacts - 1, 2, 3

Scenic Quality and Urban Visual Image Types

The assessment of impacts on scenic quality and visual image types accounts in urban settings for levels of impact. The focus of the assessment is on areas rated as scenic quality Level A or residential and park-like visual image types. The scenic quality levels have been incorporated into the visual impact analysis as shown in Tables C-6 and C-7.

Table C-6 displays the relationship between visual contrast and scenic quality classes, and Table C-7 shows the relationship between visual contrast and urban image types.

TABLE C-6 IMPACT LEVELS FOR RURAL SCENIC QUALITY CLASSES			
	Rural Scenic Quality Classes		
Visual Contrast	**Class A**	**Class B**	**Class C**
Strong	7	5	4
Strong to Moderate	6	4	3
Moderate	5	3	2
Moderate to Weak	4	2	1
Weak	3	1	1
Significant Impacts – 7, 8, 9 Potentially Significant Impacts – 4, 5, 6 Non-Significant Impacts – 1, 2, 3			

TABLE C-7 IMPACT LEVELS FOR URBAN VISUAL IMAGE TYPES				
	Urban Visual Image Types			
Visual Contrast	**Residential and Park-Like**	**Commercial Office**	**Commercial Retail**	**Industrial**
Strong	8	5	4	3
Strong to Moderate	7	4	3	2
Moderate	6	3	2	1
Moderate to Weak	5	2	1	1
Weak	4	1	1	1
Significant Impacts – 7, 8, 9 Potentially Significant Impacts – 4, 5, 6 Non-Significant Impacts – 1, 2, 3				

Mitigation

Initial impact levels were determined based on the Project description. Selective mitigation was considered to reduce visual impacts. The effectiveness of mitigation techniques in conjunction with the landscape character and visibility can be best determined at the Project design stage. Selective mitigation that would reduce visual impacts include measures are presented in Appendix D (Volume II) of the DEIS.